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Important Notice

In August 1, 2013, PABCO® Gypsum, a division of PABCO® building products, LLC acquired the QuietRock® business and operations from Serious Energy, Inc. Serious Energy, Inc. corporate structure and legal name changed through the years from Quiet Solution, Inc. to Serious Materials, Inc to Serious Energy, Inc. The acquisition of the QuietRock® business by PABCO® Gypsum includes the products, technical data, test reports and other intellectual property. For the avoidance of confusion, references to "Quiet Solution", "Serious Materials", or "Serious Energy" used within test reports, in general, should be understood as references to PABCO® Gypsum as of August 1, 2013.

CONFIDENTIAL

SUMMARY TEST REPORT

Quiet Solution QuietRock QR-530 Shearwall Testing

Report No.: P04-461-122304

Prepared for

QUIET SOLUTION, INC.
522 Almanor Ave.
Sunnyvale, CA 94085

By

NAHB Research Center, Inc.
400 Prince George's Boulevard
Upper Marlboro, MD 20774-8731

Contract No.: P04-461

December 23 2004

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PURPOSE

The purpose of this test program is to develop shear values for walls sheathed with Quiet Solution QuietRock QR-530 wall panels. Cyclic tests were conducted on one wall configuration with the QR-530 sheathing installed parallel to the studs.

TEST METHODS

Testing was conducted in accordance with general provisions of ASTM E 2126-02a[1] *Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Walls for Buildings*. Except, the CUREE protocol using delta of 1.2 inches and frequency of 0.2 Hz was used. The test was conducted twice in accordance with the ASTM standard. Testing was performed at the Laboratory Facilities of the NAHB Research Center in Upper Marlboro, Maryland in December of 2004.

Figure 1 shows a schematic of a typical shear wall test setup including instrumentation.

TEST SPECIMENS

A total of two 8-foot-wide by 8-foot-tall wall specimens were tested. Both specimens were framed using 2x4 inch nominal Southern Yellow Pine (SYP) wood studs sheathed with Quiet Solution QuietRock QR-530 wall panels. The QuietRock QR-530 panels were installed parallel to the framing. The QuietRock QR-530 wall panels were provided by the manufacturer and were installed in accordance with manufacturer's specifications. Specimen corners were restrained with Simpson Strong-Tie HTT16 holddowns. Specimen characteristics are summarized in Table 1. Figure 2 shows the construction detail for each specimen. Figure 3 shows the QuietRock QR-530 wall panel. Figure 4 shows the construction of the wood frame shear wall. Figures 5 and 6 show the test set-up for each of the specimens and close-ups of the connection and anchoring details.

An additional shear test was performed as required by the ASTM standard (see Results Section for explanation). Figure 7 shows the wall set-up of the third test.

QuietRock QR-530 panels were supplied by Quiet Solution, Inc. The NAHB Research Center did not sample the panels at the manufacturing site.

[1] ASTM Standard E2126-02[1] "*Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Walls for Buildings*". American Society for Testing and Materials. West Conshohocken, PA. 2004

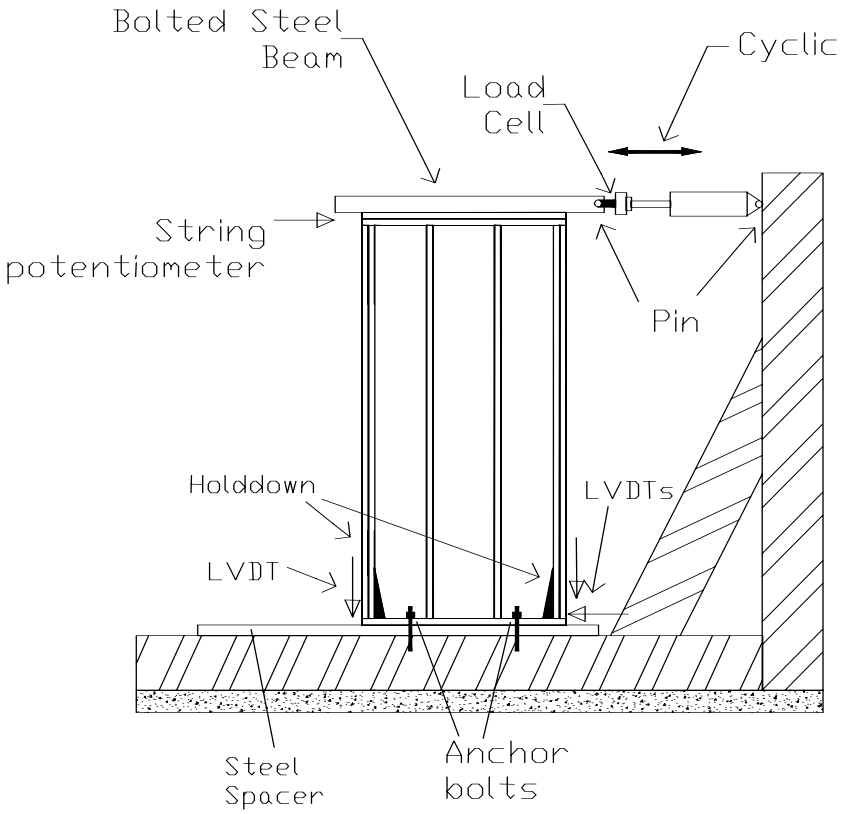

FIGURE 1 – SCHEMATIC OF A TYPICAL SHEARWALL TEST SETUP AND INSTRUMENTATION

TABLE 1
WALL SPECIMEN CHARACTERISTICS

WOOD FRAMING		
FRAMING COMPONENT	**DESCRIPTION**	
Specimen Size	8 Feet Long x 8 Feet Wide	
Openings	None	
Wood Studs Size, Species and Grade	2x4, SYP #2	
Top and Bottom Plates Size, Species and Grade	2x4, SYP #2	
Stud Spacing	24 inches on center	
Framing Nails	16d pneumatic	
Anchorage	½-inch bolts with round cut washers spaced a maximum of 4 feet on center and located at 12 inches from the wall corners	
Hold-down at corners	Simpson Strong-Tie HTT16 attached with 18-16d Sinkers; Hold-down raised about 1” from the sill plate	
WALL SHEATHING PANELS		
Sheathing Panel Type	Quiet Solution QuietRock QR-530 (See Figure 2)	
Sheathing Construction	Gypsum-Steel Sheet Composite Panel QuietRock QR-530	
Panel Size	48” Wide x 96” Long	
Nominal Thickness	½ inch	
Installation	Long dimension parallel to framing	
FASTENING SCHEDULE		
Connection	**Fastener**	**Spacing**
Top Plate to Top Plate (Face-Nailed)	16d Pneumatic	24 inches on center
Top/Bottom Plate to Stud (End-Nailed)	2-16d Pneumatic	Per connection
Stud to Stud (Face-Nailed)	16d Pneumatic	24 inches on center
Hold-down	18-16d Sinkers	Per hold-down
QR-530 Panels to Framing	No. 8 Drywall Screws (2-1/2” long)	6” o.c. at edges (perimeter) and 12” o.c. in the field (intermediate)

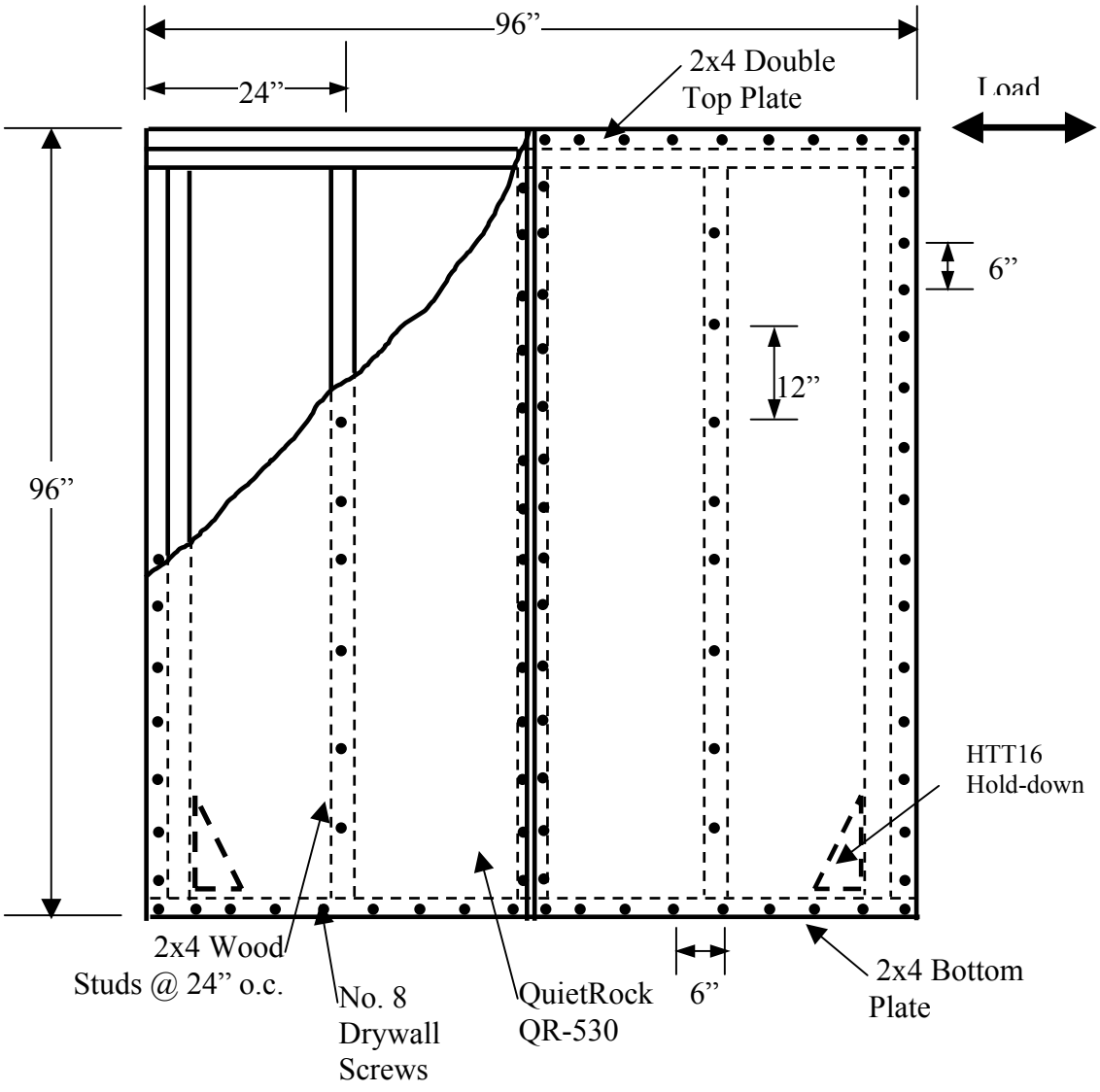

FIGURE 2 – SPECIMENS CONFIGURATION

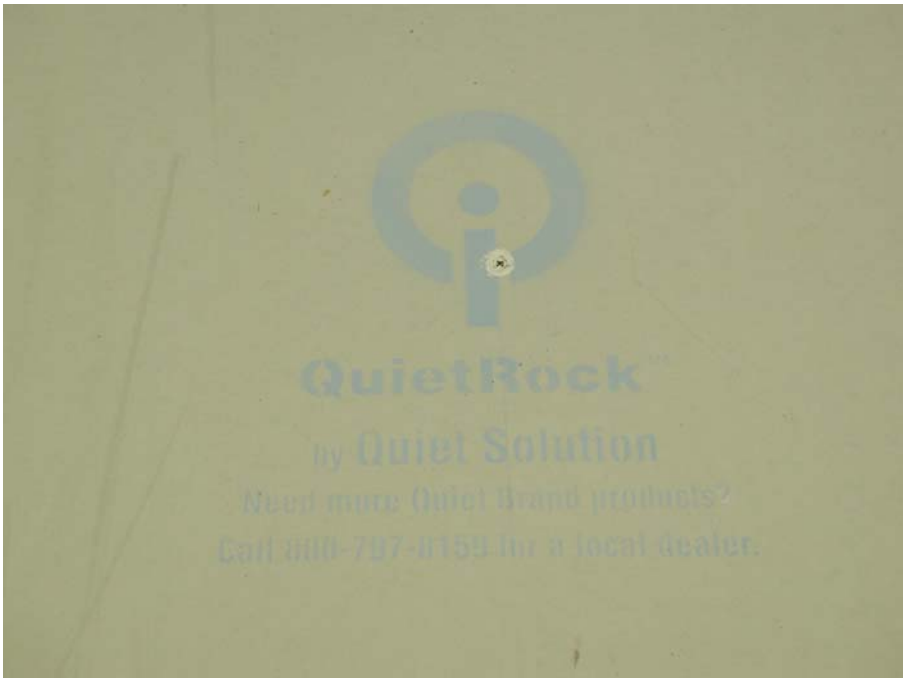

FIGURE 3 – QUIETROCK QR-530 WALL PANEL

FIGURE 4 – WALL ASSEMBLY

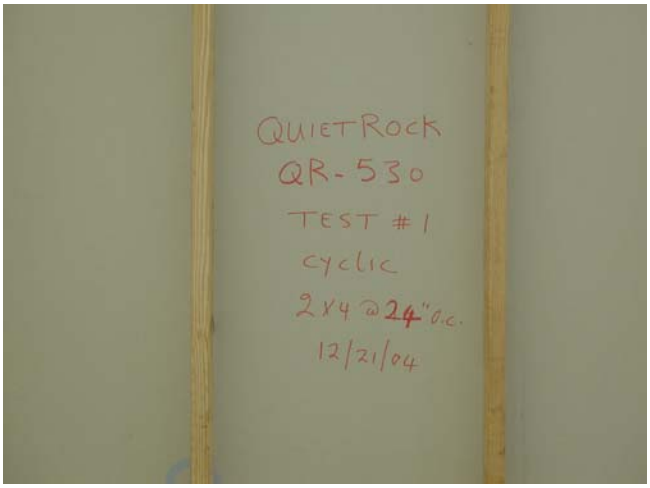

FIGURE 5 – SPECIMEN 1 CONFIGURATION (TEST 1)

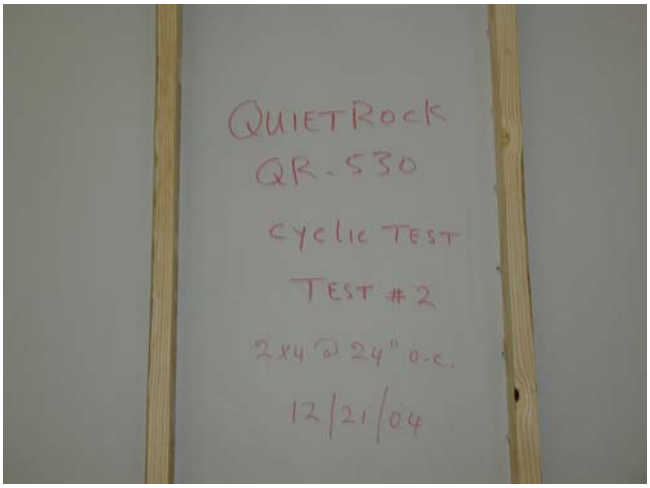

FIGURE 6 – SPECIMEN 2 CONFIGURATION (TEST 2)

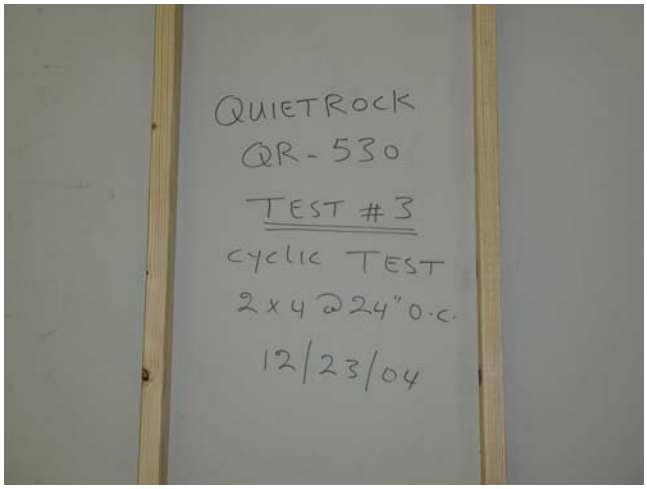

FIGURE 7 – SPECIMEN 3 CONFIGURATION (TEST 3)

TEST EQUIPMENT

The tests were performed using a racking shear apparatus. Cylinder motion was controlled using a computer-based system. Load was measured using a 20,000 lb electronic load cell. Specimen drift was measured using a string potentiometer. Specimen uplift, slip, and compressive deformation were measured using Linear Variable Differential Transformers (LVDTs). Load and displacement readings were recorded using a digital data acquisition system at a frequency of 20 Hz such that at least 100 data points were gathered for each cycle. All instruments were calibrated in accordance with the NAHB Research Center Laboratory Quality Manual.

Moisture content of lumber was measured using an electric moisture meter during fabrication and installation. The equilibrium moisture content in the laboratory was below 10 percent at time of testing. Each specimen was fabricated a minimum of 24 hours before testing.

The specimens were set on a 3.5-inch-wide steel channel spacer to allow for sheathing panel rotation without interference with the setup.

Load was applied using a hydraulic actuator at a constant frequency of 0.2 Hz (5 seconds per cycle) using a tube steel distribution beam bolted to the top plate. A maximum excursion of 3.6 inches was applied to the specimen to achieve a wall failure defined as a minimum drop in the resistance below 80 percent of the peak load.

RESULTS

Results are summarized in Table 2 and Figures 8 and 9. The average unit shear value for specimens 1 and 2 were not within the 10% required in ASTM E2126. Therefore, a third test was done and the unit shear value is computed as the mean value of the three tests. The load-deformation curve for Test 3 is shown in Figure 10. Failure modes for all tests are shown in Figures 11 through 13.

The peak loads for all Specimens tested (Tests 1, 2 and 3) were associated with a failure of the screws (screws sheared off) along the panel edges.

TABLE 2
TEST RESULTS

TEST #	DESCRIPTION	AVERAGE PEAK LOAD lb.	AVERAGE NOMINAL SHEAR LOAD lb/ft
1	QuietRock QR-531 installed parallel to framing	4,246	531
2		3,680	460
3		3,750	469
AVERAGE		**3,892**	**487**
BUILDING CODE	**DESCRIPTION**		**SHEAR LOAD lb/ft**
IBC[2]	7/16-inch plywood or OSB, one side, 8d nails with 6/12 spacing (Table 2306.4.1)	-	240[a]
IBC[2]	1/2-inch Gypsum Board, blocked with No 6 Screws with 6/12 spacing (Table 2306.4.5).	-	90[b]
IBC[2]	0.018 inch thick steel sheet (steel walls), one side with No 8 Screws, 6/12 Spacing (Table 2211.2.(3)).	-	390

[a.] Allowable shear value for walls with Douglas Fir-Larch or Southern Pine for wind and seismic

[b.] Allowable shear value for walls with Gypsum Board on one side for wind and seismic

[2] IBC 2003. *International Building Code*. International Code Council. Country Club Hills, IL. 2003.

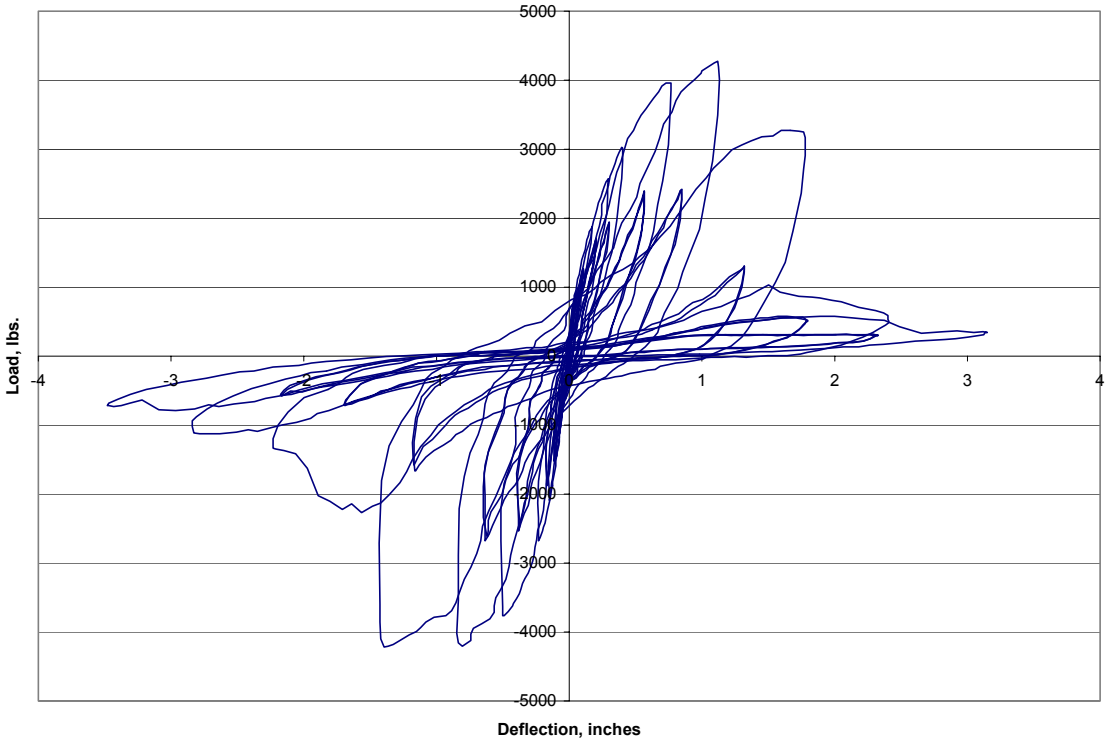

FIGURE 8 - LOAD-DEFORMATION RELATIONSHIPS – TEST 1

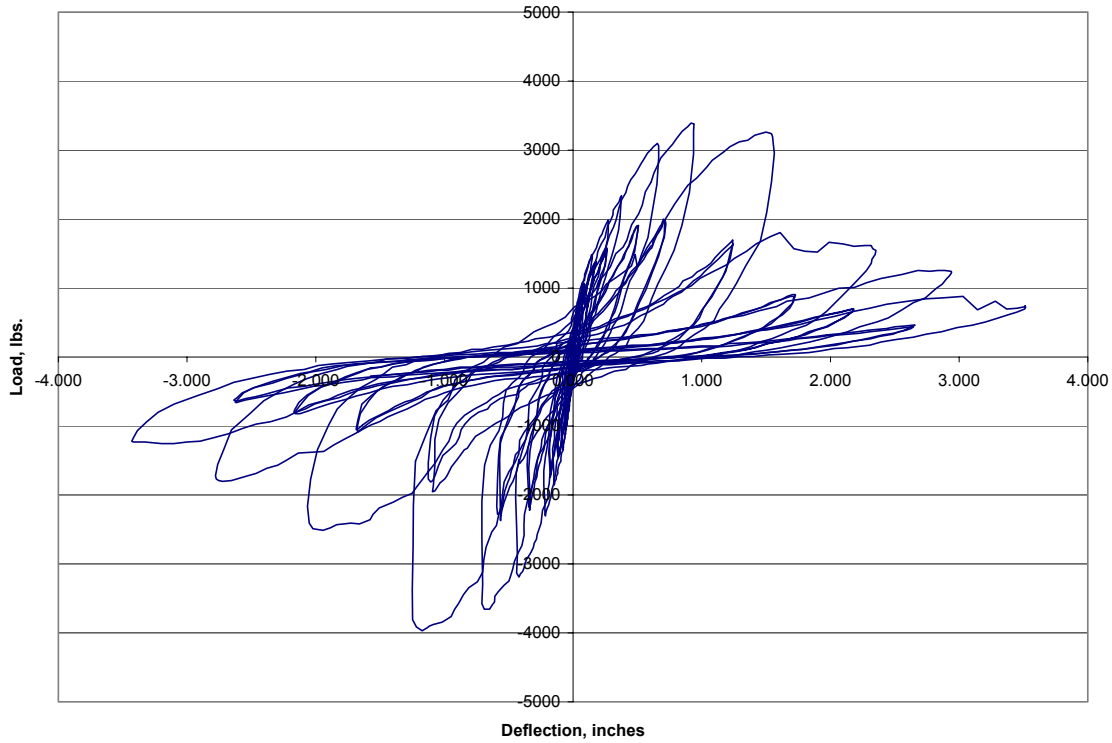

FIGURE 9 - LOAD-DEFORMATION RELATIONSHIPS – TEST 2

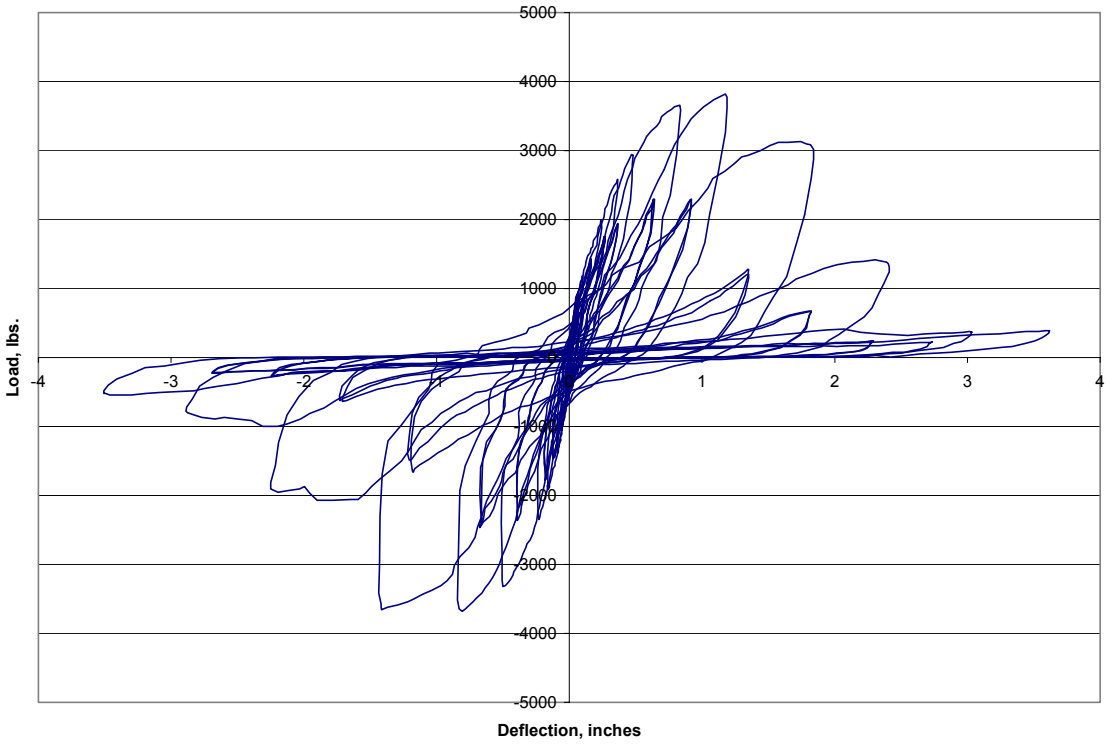

FIGURE 10 - LOAD-DEFORMATION RELATIONSHIPS – TEST 3




FIGURE 11 - FAILURE MODES
Specimen 1 – Test 1




FIGURE 12 - FAILURE MODES
Specimen 2 – Test 2

FIGURE 13 - FAILURE MODES
Specimen 3 – Test 3

SUMMARY

The nominal unit shear value for walls framed with wood and sheathed with Quiet Solution QuietRock QR-530 panels has been developed in this test report (see Table 3).

TABLE 3
NOMINAL SHEAR VALUES IN POUNDS PER LINEAR FOOT FOR SHEARWALLS FRAMED WITH WOOD AND SHEATHED WITH QUIETROCK QR-530

Assembly Description	Fastener Type	Maximum Framing Spacing (inches o.c.)	Minimum Nominal Framing Width	Nominal Unit Shear Value[1]
				Fastener Spacing[2]
				Panel Edges
				6" o.c.
Quiet Solution Quiet Rock QR-530, One Side of Wall	No. 8 Drywall Screws	24"	2"	487

[1] Nominal shear values shall be multiplied by the appropriate resistance factor φ to determine design strength or divided by the appropriate safety factor Ω to determine allowable shear values.
[2] Screws shall be attached to intermediate supports at 12 inches on center.

UNCERTAINTY

The uncertainty of the peak load measurements has been estimated at 0.6 percent. The uncertainty of the displacement measurements has been estimated at 1.2 percent. These estimates were made using Type B analysis at a 95 percent confidence level with a coverage factor of k=2.

DECLARATIONS AND DISCLAIMERS

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Nader Elhajj, P.E.
Research Engineer, Engineering Services

Signature

Date